Effect of a progestogen and an oestrogen on the γ-aminobutyric acid content in the cerebral hemispheres of ovariectomized rats

Ovariectomy increased the γ-aminobutyric acid (GABA) content in the cerebral hemispheres of young rats (Saad, 1970). I now report how a progestogen and an oestrogen affect the GABA content in the cerebral hemispheres of adult rats of 150 to 200 g. Of four groups each of 6 rats, one group received no treatment. Another group was ovariectomized and left for 30 days, two other groups were ovariectomized, left for 27 days, then given daily for 3 successive days either progesterone (5 mg/kg) or diethyldioxystilben dipropionate (Cyren B; Bayer, 0·5 mg/kg). The animals were then killed and the cerebral hemispheres of 2 rats were pooled and analysed for GABA (Saad, 1970).

The increase in GABA content in the cerebral hemispheres 30 days after ovariectomy of adult female rats amounts to 20% above the normal value. This appears to be the reverse of the effect of castration on GABA content (Tzu Yu Li & Chang Hua Wu, 1964). The intramuscular injection of progesterone, 5 mg/kg, for 3 successive days to the 27 days ovariectomized rats produced a significant decrease of 17·7% in their raised GABA content. The increased concentration of GABA of the 27 days ovariectomized rats returned to normal after the progesterone treatment.

The intramuscular injection of diethyldioxystilben dipropionate for 3 successive days to the 27 days ovariectomized rats did not produce any significant difference in their cerebral hemisphere GABA content.

Table 1. *GABA content in the cerebral hemispheres of* 30 *days ovariectomized adult female rats compared with the normal content, and the effect of* 3 *successive daily intramuscular injections of progesterone* (5 *mg/kg*) *and diethyldioxystilben dipropionate* (0·5 *mg/kg*) *on the* 27 *day ovariectomized rats*

	GABA content (mg/100 g wet tissue)			
		30 days after ovariectomy		
Sample data	Controls	Without treatment	Progesterone (3 days)	Oestrogen (3 days)
1	16·7	21·0	17·4	20·4
2	18·3	23·0	19·1	22·7
3	21·6	23·9	19·4	23·6
x	18·9	22·6*	18·6†	22·2
s.e.	1·45	0·9	0·6	1·0

* Significant increase ($P < 0·05$) compared with control.
† Significant decrease ($P < 0·0125$) compared with the GABA content after 30 days of ovariectomy.

The change in GABA content in the cerebral hemispheres induced by different drugs or treatments is of importance since GABA has a depressant action on both the superficial layers of the cortex (Iwama & Jasper, 1957) and on deeper structures (Rech & Domino, 1960; Krnjevic & Phillis, 1963).

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Effects of the marihuana-homologue, pyrahexyl, on open field behaviour in the rat

Four concentrations of pyrahexyl (2·5, 5·0, 10·0 and 15·0 mg/kg) dissolved in olive oil, were administered intraperitoneally to four groups of Long Evans hooded rats 2–3 months old of either sex. There were two males and two females in each group. A fifth control group received only olive oil. The rats were observed $2\frac{1}{2}$ h after injection for 5 min in a $30 \times 18\frac{1}{2} \times 18$ inch open field which had been marked off in squares. Four measures of behaviour were recorded: activity as defined by the number of lines a rat crossed with both hind feet; rearing, which was scored whenever the animal stood on its hind legs for any purpose other than grooming; grooming, defined as any response involving the smoothing of the fur or bring the forefeet to the face for the purpose of "washing"; and defaecation.

The evidence was examined by a one-way analysis of variance (Hays, 1965). A dose-dependent effect of pyrahexyl on activity ($F = 7{\cdot}01$, $df = 4{\cdot}15$, $P < 0{\cdot}01$) was found. At 10 mg/kg there was no noticeable difference in activity between the treated and untreated rats. However, at 2·5 and 5 mg/kg of pyrahexyl, activity was increased above the control values whereas at 15 mg/kg, activity was depressed.

Rearing was also affected significantly by pyrahexyl ($F = 26{\cdot}79$, $df = 4, 15$, $P < 0{\cdot}01$), a progressive inhibitory effect being seen as the dosage increased, 10–15 mg/kg of the drug inhibiting rearing by 50%.

Neither grooming nor defaecation was significantly affected.

The relation between dosage level and activity is complex; the change in activity response with dose demonstrates how different conclusions about the effects of pyrahexyl could be reached according to dosage. But as rearing was progressively suppressed as drug dosage was increased, various behavioural responses appear to be differentially affected by the drug.

Walters & Abel (1970) found that while pyrahexyl did not affect jumping behaviour itself, it did reduce the latency in the jumping response of gerbils to a stimulus which signalled the onset of shock. But, with rats, Abel & Schiff (1969) found pyrahexyl increased the amount of time spent in observing other animals. It appears then, that the affects of pyrahexyl are not only dose-dependent but are also response specific.

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